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The National Nuclear Energy Series: An Abridged Compilation

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Abstract

This report is a compilation of the volumes of the National Nuclear Energy Series (NNES). The report consists of: a selection of original prefaces from the NNES, a summary table of all of the NNES volumes, and a large appendix containing the table of contents of each volume.

APPENDIX A: NNES Preface

This volume is one of a series which has been prepared as a record of the research work done under the Manhattan Project and the Atomic Energy Commission. The name Manhattan Project was assigned by the Corps of Engineers, War Department, to the far-flung scientific and engineering activities which had as their objective the utilization of atomic energy for military purposes. In the attainment of this objective, there were many developments in scientific and technical fields which were of general interest. The National Nuclear Energy Series (Manhattan Project Technical Section) is a record of these scientific and technical contributions, as well as of the developments in these fields which are being sponsored by the Atomic Energy Commission.

The National Nuclear Energy Series, when completed, is expected to consist of approximately 100 volumes. These will be grouped into ten divisions, as follows:

Division	I	- Electromagnetic Separation Project
Division	II	- Gaseous Diffusion Project
Division	III	- Special Separations Project
Division	IV	- Plutonium Project
Division	V	- Los Alamos Project
Division	VI	- University of Rochester Project
Division	VII	- Materials Procurement Project
Division	VIII	- Manhattan Project
Division	IX	- Thermal Diffusion Project
Division	X	- Centrifuge Project

Soon after the close of the war the Manhattan Project was able to give its attention to the preparation of a complete record of the research work accomplished under Project contracts. Writing programs were authorized at all laboratories, with the object of obtaining complete coverage of Project results. Each major installation was requested to designate one or more representatives to make up a committee, which was called first the Manhattan Project Editorial Advisory Board and later simply the Project Editorial Advisory Board. This group was planned to coordinate the writing programs at all installations and to act as an advisory group in all matters affecting the Project-wide writing program.

APPENDIX B: NNES Division IV Foreward

Since the discovery of practical means of utilizing the energy of the atomic nucleus, a large and complex atomic energy industry has begun in the United States. As a result of conditions in the world, external to the United States, the requirements of national security have been paramount in our development of this industry thus far. Constant and increasing attention, however, has been given to the problems of economic nuclear power and to the medical and industrial applications of radioactive materials with a view toward "improving the public welfare, increasing the standard of living, strengthening free competition in private enterprise, and promoting world peace." To this end the Atomic Energy Commission has sought the most effective means to accelerate the practical exploitation of nuclear data by American science and industry. The National Nuclear Energy Series is designed to provide for scientists and engineers as comprehensive a source of such data as is possible. The scope of the information presented in these volumes is a measure of American achievements to date in the field of atomic science.

Lewis L. Strauss, Chairman
U.S. Atomic Energy Commission

APPENDIX C: Plutonium Project Record Foreward

(reproduced from NNES – IV – 12)

This report is a technical account of information collected while developing methods for producing plutonium. Some of the information deals directly with nuclear physics and chemistry. Most of it is related rather to technical processes that needed to be performed in preparation for making the plutonium. These publications represent selections from the great mass of current reports, made on the basis of their value to basic science and technology.

The current technical reports, written during the war years, were essential to the active work of the plutonium project. They supplied needed data and calculations to those who were planning the new processes. Selecting from this mass of records the most reliable data and presenting them in a useful form has been an enormous task, for which the writers and editors of these volumes deserve the sincere thanks of their scientific colleagues. Many fields of science and technology will develop more rapidly because of this knowledge.

The efforts of the men who did this research resulted in the successful production of atomic bombs, which shortened the war and saved the lives of many of their comrades. But in the long view of history it is probable that the major human heritage from their work will not be this quick victory. It may not even be the useful applications of atomic energy, which was first presented as a Promethean gift to man. It is not likely that the scientific information in these pages may be the starting point to new reaches of knowledge, which will give to man an understanding that will truly enrich his life

Arthur H. Compton

NNES – IV – 20

INDUSTRIAL MEDICINE OF THE PLUTONIUM PROJECT: SURVEY AND COLLECTED PAPERS

Edited by Robert S. Stone

Published 1951
McGraw-Hill Book Company, Inc., New York
511 pages plus xxiv pages

Chapter		Report No.
	General Introduction to Reports on Medicine, Health Physics and Biology by Robert S. Stone	AECD-1987
	Part A – Survey	
1	Medical Services of the Plutonium Project by J. E. Wirth	CH-3543
2	Biological Bases for Maximum Permissible Exposures by S. T. Cantril	MDDC-601 (CH-3571)
3	Protective Measures for Personnel by J. J. Nickson	AECD-2424 (CH-3763)
4	Clinical Laboratory Examination of Plutonium Project Personnel by L. O. Jacobson and Edna K. Marks	MDDC-1262 (CH-3724)
5	Hematological Effects of Ionizing Radiations by L. O. Jacobson, Edna K. Marks, and Egon Lorenz	AECD-2085 (CH-3864)
6	Biochemical Studies Relating to the Effects of Radiation and Metals by Samuel Schwartz	AECD-2198 (CH-3820)
7	Uranium Excretion Studies by R. J. Ferretti, G. R. Price, and Samuel Schwartz	MDDC-541 (CH-3592)
8	Distribution and Excretion of Plutonium by E. R. Russell and J. J. Nickson	MDDC-503 (MUC-ERR-209)
9	Management and Treatment of Exposed Personnel by J. E. Wirth	MDDC-1728 (CH-3761)
10	Requirements of an Adequate Health Service in Relation to Atomic Research and Industrial Development by S. T. Cantril, J. J. Nickson, J. E. Wirth, and Robert S. Stone	MDDC-686 (CH-3544)
	Part B – Collected Papers	
Paper		
1	Industrial Medical Program – Hanford Engineering Works by S. T. Cantril	MDDC-602 (CH-3553)
2	Blood Changes in Human Beings Following Total-body Irradiation by J. J. Nickson	AECD-2432 (CH-3868)
3	Hematological Studies on Patients Treated by Total-body Exposure to X-rays by B. V. A. Low-Beer and Robert S. Stone	AECD-2348 (CH-3863)

(Continued)

Paper		Report No.
4	Changes in Mean Blood Levels of Metallurgical Laboratory Employees during the First Year of Employment as Related to Working Conditions by Norman Pearlman and G. A. Sacher	AECD-2030 (CH-3865)
5	Biometric Investigations of Blood Constituents and Characteristics in a Population of Project Workers by G. A. Sacher, L. O. Jacobson, Edna K. Marks, and S. L. Tyler	AECD-2248 (CH-3871)
6	Effect of Exercise on Leucopenia: A Statistical Analysis by Edna K. Marks, G. A. Sacher, and L. O. Jacobson	AECD-2113 (ANL-HDY-466)
7	Determination of Radium in Excreta by E. R. Russell and G. W. Reed, Jr.	MDDC-226
8	Treatment of Plutonium Poisoning by Metal Displacement by Jack Schubert	MDDC-595
9	Status of Health and Protection at Hanford Engineering Works by S. T. Cantril and H. M. Parker	MDDC-1198 (CH-3570)
10	Tolerance to Whole-body Irradiation by Patients with Advanced Cancer by L. F. Craver	MDDC-993 (CH-3369)
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NNES – IV – 22B

BIOLOGICAL EFFECTS OF EXTERNAL X AND GAMMA RADIATION: PART I

Edited by Raymond E. Zirkle

Published 1954
McGraw-Hill Book Company, Inc., New York
530 pages plus xxvi pages

Chapter		Report No.
1	Effects of Long-continued Total-body Gamma Irradiation on Mice, Guinea Pigs, and Rabbits. I. Preliminary Experiments by Egon Lorenz and Walter E. Heston	MDDC-653
2	Effects of Long-continued Total-body Gamma Irradiation on Mice, Guinea Pigs, and Rabbits. II. Physical Arrangement by Egon Lorenz	MDDC-654
3	Effects of Long-continued Total-body Gamma Irradiation on Mice, Guinea Pigs, and Rabbits. III. Effects on Life Span, Weight, Blood Picture, and Carcinogenesis and the Role of the Intensity of Radiation by Egon Lorenz, Leon O. Jacobson, Walter E. Heston, Michael Shimkin, Allen B. Eschenbrenner, Margaret K. Deringer, Jane Doniger, and Robert Schweisthal	MDDC-655
4	Effects of Long-continued Total-body Gamma Irradiation on Mice, Guinea Pigs, and Rabbits. IV. Actions on the Breeding Behavior of Mice by Margaret K. Deringer, Walter E. Heston, and Egon Lorenz	MDDC-1247
5	Effects of Long-continued Total-body Gamma Irradiation on Mice, Guinea Pigs, and Rabbits. V. Pathological Observations by Allen B. Eschenbrenner and Eliza Miller	MDDC-642
6	Effects of Long-continued Total-body Gamma Irradiation on Mice, Guinea Pigs, and Rabbits. VI. Conclusions and Applicability of Results to the Problem of Human Protection by Egon Lorenz	MDDC-656
7	Effects of Total-body X Irradiation on Rabbits. I. Mortality after Single and Paired Doses by Charles W. Hagen, Jr., and George A. Sacher	MDDC-1252
8	Effects of Total-body X Irradiation on Rabbits. II. Hematological Effects by Leon O. Jacobson, Edna K. Marks, Eric L. Simmons, Charles W. Hagen Jr., and Raymond E. Zirkle	MDDC-1174
9	Effects of Total-body X Irradiation on Rabbits. III. Effects on the Leucocytes by George A. Sacher and Norman Pearlman	MDDC-1274
10	Effects of Total-body X Irradiation on a Preexisting Induced Anemia in Rabbits. I. Response of Animals with Anemia Induced by Phenylhydrazine by Leon O. Jacobson, Edna K. Marks, Evelyn Gaston, and Eric L. Simmons	MDDC-1004 MDDC-261

(Continued)

Chapter		Report No.
11	Effects of Total-body X Irradiation on a Preexisting Induced Anemia in Rabbits. II. Response of Animals with an Anemia Induced by Bleeding by Leon O. Jacobson, Edna K. Marks, and Evelyn Gaston	MDDC-1004
12	Effects of Total-body X Irradiation on a Preexisting Induced Anemia in Rabbits. III. Histopathological Studies by Matthew H. Block, Leon O. Jacobson, Edna K. Marks, and Evelyn Gaston	ANL-4205
13	Heparinemia. An Anticoagulant in the Blood of Dogs with Hemorrhagic Tendency after Total-body Exposure to Roentgen Rays by J. Garrott Allen, Margaret Sanderson, Mary Milham, Alice Kirschen, and Leon O. Jacobson	MDDC-481
14	An Electrophoretic Study of the Effects of X Rays on the Plasma Protein Pattern in Dogs by John A. Muntz, E. S. Guzman Barron, and C. Ladd Prosser	MDDC-371
15	Effects of X Rays on the Activity of Enzymes by E. S. Guzman Barron, Sherman R. Dickman, Thomas P. Singer, and John A. Muntz	MDDC-1131
16	Effects of X Rays on Tissue Metabolism by E. S. Guzman Barron	AECD-2316
17	Effects of X Rays on the Metabolism of the Small Intestine and Its Permeability to Glucose by E. S. Guzman Barron, William Wolkowitz, and John A. Muntz	MDDC-1241
18	Effects of X Rays on Immunity by William H. Taliaferro and Lucy Graves Taliaferro	AECU-240
19	Radiation-induced Changes in Ultraviolet Absorption Spectra of Urine I. General Effects by Lee Wattenberg and Samuel Schwartz	MDDC-700
20	Radiation-induced Changes in Ultraviolet Absorption Spectra of Urine II. Quantitative Spectrophotometric Studies by Lee Wattenberg and Samuel Schwartz	MDDC-701
21	The Effectiveness of Drugs in Preventing or Alleviating X-ray Damage by Eric L. Simmons, Leon O. Jacobson, Norman Pearlman, and C. Ladd Prosser	MDDC-1277
22	Methods of Exposure of Animals to X Rays by Charles W. Hagen, Jr., and Raymond E. Zirkle	
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NNES – IV – 22E

BIOLOGICAL EFFECTS OF EXTERNAL BETA RADIATION

Edited by Raymond E. Zirkle

Published 1951
McGraw-Hill Book Company, Inc., New York
242 pages plus xxv pages

Paper		Report No.
1	Techniques of External Irradiation with Beta Rays by J. R. Raper, Raymond E. Zirkle, and K.K. Barnes	MDDC-661
2	Gross Effects of Beta Irradiation on Restricted Surface of Rabbits by J. R. Raper, J. E. Wirth, and K. K. Barnes	MDDC-500
3	Comparative Lethal Effects of External Beta Irradiation by J. R. Raper, Raymond E. Zirkle, and K. K. Barnes	MDDC-439
4	Gross Effects of Total-surface Beta Irradiation by J. R. Raper and K. K. Barnes	MDDC-49 MDDC-501
5	Rate of Recovery from Total-surface Beta Irradiation by J. R. Raper and K. K. Barnes	MDDC-502
6	Additivity of Lethal Effects of External Beta and Gamma Irradiation (I) by J. R. Raper and K. K. Barnes	MDDC-498
7	Additivity of Lethal Effects of External Beta and Gamma Irradiation (II) by J. R. Raper and K. K. Barnes	MDDC-1681
8	Influence of Total-surface Beta Irradiation of the Gross Metabolic Patterns of Rats by Elizabeth Anderson Barnes	AECD-2228
9	Histopathological Effects of Single Doses of Total-surface Beta Radiation on Mice by R. S. Snider and J. R. Raper	MDDC-583
10	Effects of External Irradiation with Beta Rays on the Peripheral Blood of Rabbits by J. R. Raper and K. K. Barnes	MDDC-579
11	Changes in Peripheral Blood after Single Doses of External Beta Radiation by Elizabeth Anderson Barnes	MDDC-534
12	Reactions of Human Skin to Single Doses of Beta Rays by J. E. Wirth and J. R. Raper	MDDC-508
13	Delayed Effects of Single Exposures to External Beta Rays by J. R. Raper, P. S. Henshaw, and R. S. Snider	MDDC-578
14	Effects of Periodic Total-surface Beta Irradiation by J. R. Raper, P. S. Henshaw, and R. S. Snider	MDDC-580
15	Aberrant Tissue Developments of Rats Exposed to Beta Rays. Late Effects of P^{32} Beta Rays by P. S. Henshaw, R. S. Snider, and E. F. Riley, Jr.	MDDC-1663
16	Review of Information Bearing on the Tumor-inducing Action of Superficial Radiations by P. S. Henshaw and R. S. Snider	MDDC-570
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NNES – IV – 22F

METABOLISM AND BIOLOGICAL EFFECTS OF INTERNAL EMITTERS

Edited by Raymond E. Zirkle and Marjory Lawson

Based on handwritten notes in the copy of TID-373 held by the DOE Historian in Germantown, this volume was never published. Information intended for this volume is listed in the table of contents below.

Paper		Report No.
	Part V – Radiobiology Collected Papers	
1	Preparation of Fission Products for Use in an Experimental Biology Laboratory by A. Broido	MDDC-1244
2	Methods of Analysis of Fission Products in an Experimental Biology Laboratory by P. C. Tompkins, A. Broido, and L. Wish	MDDC-616
3	The Quantitative Estimation of the Activity of Beta-particle Emitters by A. Broido, J. Teresi, and P. C. Tompkins	MDDC-598
4	Methods for the Quantification of Radium by P. C. Tompkins, A. Broido, and J. D. Teresi	MDDC-699
5	The Handling of Radioactive Materials in an Experimental Biology Laboratory by P. C. Tompkins, A. Broido, and J. D. Teresi	MDDC-377
6	An Improved Method for Cutting Undecalcified Bone Sections and Its Application to Radioautography by Dorothy Axelrod	MDDC-450
7	Calculation of Dosage Due to Internal Emitters by W. Cohn	
8	The Metabolism of Carrier-free Fission Products in the Rat by K. G. Scott, R. Overstreet, L. Jacobson, J. G. Hamilton, H. Fisher, J. Crowley, I. L. Chaikoff, C. Entenman, M. Fishler, A. J. Barber, and F. Loomis	MDDC-1275
9	Radiotoxicity of Injected Sr^{89} for Rats, Mice, and Rabbits	
	I. Introduction: Methods by D. S. Anthony, K. Lathrop, and R. D. Finkle	MDDC-1540
	II. Metabolism and Organ Distribution by D. S. Anthony, K. Lathrop, and R. D. Finkle	MDDC-1540
	III. Lethal Action and Clinical Changes by D. S. Anthony, K. Lathrop, and R. H. Snyder	MDDC-1364
	IV. Hematological Effects of Enterally and Parenterally Administered Sr^{89} by E. L. Simmons and L. O. Jacobson	MDDC-1387
10	Acute Radiotoxicity of $(Ba\text{-}La)^{140}$ in Rats and Mice	
	I. Preparation and Administration of the Emitters by R. D. Finkle, R. H. Snyder, and P. C. Tompkins	MDDC-1248
	II. Metabolism by R. H. Snyder, W. E. Kisieleski, D. S. Anthony, and R. D. Finkle	MDDC-1278

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Paper		Report No.
	III. Effects on Weight and Food Intake by R. H. Snyder, G. Sacher, and J. Teresi	MDDC-1343
	IV. Lethal Action and Clinical Symptons by R. D. Finkle, R. H. Snyder, and W. E. Kisieleski	MDDC-1207
	V. Effect on the Hematological Constituents of the Peripheral Blood by L. O. Jacobson	MDDC-1261
11	Acute Radiotoxicity of Injected Ce^{144} in the Rat by D. S. Anthony and Katherine A. Lathrop	MDDC-1326
12	Acute Radiotoxicity of Injected Y^{91} by D. S. Anthony	MDDC-1240
13	Metabolism and Lethal Action of Injected P^{32} in Mice by D. S. Anthony and R. H. Snyder	MDDC-881
14	The Deposition of Plutonium and Certain Fission Products in Bone as a Decontamination Problem	AECD-2483
	I. Factors Affecting the Absorption of Radioactive Strontium from the Gut by D. H. Copp, D. M. Greenberg, and J. G. Hamilton	
	II. Factors Affecting the Retention of Injected Radioactive Strontium by D. H. Copp, D. M. Greenberg, and J. G. Hamilton	
	III. Effect of Age and Dietary Calcium on Radioactive Sr, Y, Ce, and Pu by D. H. Copp, M. J. Chace, and J. G. Hamilton	
	IV. Effect of Treatment on Chronic Elimination of Radioactive Sr, Y, Ce, and Pu by D. H. Copp, L. Van Middlesworth, E. M. Cuthbertson, M. J. Chace, and J. G. Hamilton	
	V. Uptake of Radioactive Sr, Y, and Pu in Healing Fracture Callus by L. Van Middlesworth, D. H. Copp, and J. G. Hamilton	
	VI. Effects of Severe Phosphorous Deficiency by D. H. Copp, M. J. Chace, and J. G. Hamilton	
	VII. Bone Radioautographs of Radioactive Sr, Y, Ce, Zr, and Pu by Dorothy Axelrod, D. H. Copp, and J. G. Hamilton	

NNES – IV – 22G

METABOLISM AND BIOLOGICAL EFFECTS OF INTERNAL EMITTERS

Edited by Raymond E. Zirkle and M. Lawson

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Paper		Report No.
	Part V – Radiobiology Collected Papers (Continued)	
15	Production and Analysis of Radioactive Aerosols by R. Abrams, A. M. Potts, C. E. Beilman, I. Wender, W. Lohr, S. Postel, and L. L. Forker	MDDC-795
16	Metabolism of Inhaled Fission-product Aerosols by R. Abrams, H. C. Seibert, A. M. Potts, W. Lohr, and S. Postel	MDDC-248
17	Tracer Studies with Inhaled 8-day Iodine by Mary Dailey, I. Wender, and R. Abrams	MDDC-251
18	Tracer Studies with Inhaled 1.0-year Ruthenium by Mary Dailey, I. Wender, and R. Abrams	MDDC-420
19	Acute Toxicity of Inhaled 275-day Ce^{144} by H. C. Seibert and R. Abrams	MDDC-329
20	Studies on the Inhalation of Fissionable Materials and Fission Products and Their Subsequent Fate in Rats and Man by K. G. Scott, Dorothy Axelrod, J. Crowley, H. C. Lanz, and J. G. Hamilton	MDDC-1276
21	Metabolism and Distribution of Inhaled Plutonium in Rats by R. Abrams, H. C. Seibert, A. M. Potts, L. L. Forker, D. M. Greenberg, S. Postel, and W. Lohr	MDDC-677
22	Acute Toxicity of Intubated Plutonium Deposited in the Lungs by R. Abrams, H. C. Seibert, L. L. Forker, D. M. Greenberg, H. Lisco, L. O. Jacobson, and Eric L. Simmons	CH-3875
23	Metabolism of Plutonium in Rats by K. G. Scott, H. Fisher, Dorothy Axelrod, J. Crowley, A. J. Barber, and J. G. Hamilton	MDDC-1018
24	A Comparison of the Metabolism of Plutonium (Pu^{238}) in Man and the Rat by J. Crowley, H. C. Lanz, K. G. Scott, and J. G. Hamilton	CH-3589
25	The Toxicity and Metabolism of Plutonium in Laboratory Mammals	MDDC-1140
	I. Introduction by R. H. Snyder and R. D. Finkle	
	II. Methods by R. H. Snyder and W. E. Kisieleski	
	III. The Metabolism of Injected Plutonium by R. H. Snyder, W. E. Kisieleski, B. Lawrence, and R. D. Finkle	
	IV. The Survival and Growth of Plutonium-injected Animals by R. H. Snyder, W. E. Kisieleski, and R. D. Finkle	

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Paper	Report No.	
	V. The Effect of Ingested Plutonium by R. H. Snyder, B. Lawrence, and R. D. Finkle	
	VI. The Hematological Effects of Parenterally Administered Plutonium by L. O. Jacobson and E. L. Simmons	
26	The Effect of Plutonium on Tissue Metabolism of Rats by E. S. G. Barron, R. Abrams, R. D. Finkle, and R. P. Rhoades	MDDC-1653
27	Combination of Plutonium with Plasma Proteins by J. Muntz and E. S. G. Barron	MDDC-1268

NNES – IV – 22H

METABOLISM AND BIOLOGICAL EFFECTS OF INTERNAL EMITTERS

Edited by Raymond E. Zirkle and M. Lawson

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28	The Metabolism of Thorium*1, Protactinium*1, and Neptunium*2 in the Rat by H. C. Lanz, K. G. Scott, J. Crowley, and J. G. Hamilton	MDDC-648
29	The Production of Radioactive Xenon for Animal Exposures by R. Abrams, C. E. Beilman, and L. D. Norris	MDDC-1325
30	The Maintenance of Animals Containing Radioactive Materials by P. Britton, Patricia Lear, C. L. Prosser, and Ella Tyree	MDDC-1243
31	Apparatus for Injection of Animals with Dangerous Amounts of Hard Beta and Gamma Emitters by D. S. Anthony and W. O. Norris	AECD-2007
32	An Apparatus for Maintaining a Slow and Constant Rate of Injection by R. H. Snyder, Blanche Lawrence, and R. D. Finkle	MDDC-270
33	The Administration of Radioactive Materials to Animals by Tracheal Intubation by H. C. Seibert	MDDC-268
34	Accumulation and Distribution of Radioactive Strontium, Barium-Lanthanum Fission Mixture, and Sodium in Goldfish by C. L. Prosser, W. Pervinsek, Jane Arnold, G. Svihla, and P. C. Tompkins	MDDC-496
35	The Lethal Action of X Radiation, Stable Isotopes of Fission Elements, Sr^{89} and $(Ba\text{-}La)^{140}$, upon Goldfish by C. L. Prosser, C. W. Hagen, Jr., and W. Grundhauser	MDDC-1480
36	Plant Studies by L. Jacobson and R. Overstreet	MDDC-571
37	Absorption and fixation of Fission Products and Plutonium by Plants by L. Jacobson and R. Overstreet	CH-3588
38	The Metabolism of Short-lived Air-borne Fission Products by H. C. Lanz, J. Teresi, and H. J. Curtis	MDDC-954
39	The Effect of Clay on the Intestinal Absorption of Strontium by H. J. Curtis	MDDC-419
40	The Transmission of Radiostrontium and Plutonium from Mother to Offspring in Laboratory Animals by Miriam P. Finkle	MDDC-750
41	Studies of the Metabolism and Toxic Action of Injected Radium I. Metabolism, Lethal Action and Clinical Changes by W. P. Norris and H. B. Evans	AECD-1965

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	II. Hematological Effects of Parenterally Administered Radium. A Comparison of Plutonium and Radium Effects by L. O. Jacobson and E. L. Simmons	AECD-2372
42	The Excretion, Retention, Distribution, and Clinical Effects of Strontium^{89} in the Dog	
	I. Report of Experimental Work by Marguerite N. Swift and C. L. Prosser	MDDC-1388
	II. Statistical Analysis of Excretion and Retention for Individual Dogs by G. Sacher	AECD-2108
43	Comparative Action of Injected Sr^{89} on Splenectomized and Non-splenectomized Mice by L. O. Jacobson and E. L. Simmons	CH-3886
44	Acute Radiotoxicity of Injected Na^{24} for Mice and Rats	
	I. Metabolism and General Toxicity by R. D. Finkle and R. H. Snyder	AECD-2011
	II. The Effect of the Na^{24} on the Leucocytes of the Peripheral Blood of Mice by L. O. Jacobson, and E. L. Simmons	AECD-2036
45	Effects of Insoluble Ingested Y^{91}	
	I. Introduction: Methods by D. S. Anthony	
	II. Metabolism by D. S. Anthony and W. Grundhauser	
	III. Acute Lethal Action by D. S. Anthony	
	IV. Measurement of Dosage by D. S. Anthony, W. Grundhauser, and G. Svihla	
	V. Chronic Lethal Action by A. M. Brues and W. Grundhauser	
	VI. Effects on Weight by D. S. Anthony and W. Grundhauser	
	VII. Pathological Effects by H. Lisco and G. Sacher	
	VIII. Hematological Effects by L. O. Jacobson and E. L. Simmons	
46	Clinical Physiology of Dogs Injected with Plutonium by Elizabeth E. Painter, E. R. russell, C. L. Prosser, Marguerite N. Swift, W. E. Kisieleski, and G. Sacher	CH-3858
47	Effects of Sr^{89} and X Radiation on Goats by Marguerite N. Swift, C. L. Prosser, and E. S. Mika. (Contributions by Leon O. Jacobson, Herman Lisco, George Sacher, Roberta Edwards, La Forne Little, Homer Hipple, and Oscar Klioze)	AECU-108
48	Radioautographic Methods by G. Svihla	
49	The Effect of Folic Acid on the Response of the Peripheral Blood and Blood-forming Tissue of the Rat to Perenterally Administered Strontium^{89} by L. O. Jacobson, S. P. Stearner, E. L. Simmons, and M. H. Black	ANL-4125
50	Plutonium in Puncture Wounds and Lacerations. A Preliminary Study by R. D. Finkle, J. D. Teresi, R. H. Snyder, and J. J. Nickson	

NNES – IV – 22I

HISTOPATHOLOGY OF IRRADIATION FROM EXTERNAL AND INTERNAL SOURCES

Edited by William Bloom

Major Report Number: MDDC-488
Published 1948
McGraw-Hill Book Company, Inc., New York
808 pages plus xxv pages

Chapter		Report No.
1	Introduction by William Bloom	This volume is made up of Report MDDC-488
2	Materials and Methods by Raymond G. Murray, Ella Tyree, Marjorie Ismond, and George Svihla	
3	The Cell by William Bloom	
4	The Skin by Ray S. Snider	
5	Bone by Minnie Heller	
6	Bone Marrow by Margaret A. Bloom	
7	The Spleen by Raymond G. Murray	
8	Lymph Node and Intestinal Lymphatic Tissue by Peter Paul Henry De Bruyn	
9	The Thymus by Raymond G. Murray	
10	The Gastrointestinal Tract by Mila Pierce	
11	Structures Accessory to the Gastrointestinal Tract by Ruth Pinkney Rhoades	
12	The Testis by Minnie Heller	
13	The Ovary by William Bloom	
14	The Kidney by William Bloom	
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18	The Nervous System by Ray S. Snider	

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TOXICOLOGY OF URANIUM: SURVEY AND COLLECTED PAPERS

Edited by Albert Tannenbaum

Published 1951
McGraw-Hill Book Company, Inc., New York
333 pages plus xxvi pages

Chapter		Report No.
	Part A – Introduction to the Toxicology of Uranium (Report # CH-3696)	
1	Introduction and General Considerations by Albert Tannenbaum and Herbert Silverstone	AECD-1993-A
2	Nature of Uranium Poisoning as Observed in Mice by Albert Tannenbaum and Herbert Silverstone	AECD-1993-B
3	Factors Affecting Uranium Poisoning by Albert Tannenbaum and Herbert Silverstone	AECD-1993-C
4	Distribution in Tissues and Excretion of Uranium by Albert Tannenbaum and Herbert Silverstone	AECD-1993-D
5	Gross and Microscopic Pathology of Uranium Poisoning by Albert Tannenbaum	AECD-1993-E
6	h S rt e c n Al	

Paper		Report No.
7	Distribution of U^{233} in Tissues of Mice Following Injection with Uranyl Nitrate by Albert Tannenbaum, Herbert Silverstone and Janet Koziol	MDDC-1280 MUC-RSS-563
8	Tracer Studies of the Distribution and Excretion of Uranium in Mice, Rats, and Dogs by Albert Tannenbaum, Herbert Silverstone and Janet Koziol	AECD-2167 CH-3659
9	The Transport of Uranium to the Tissues by John A. Muntz and E. S. Guzman Barron	MDDC-760 CH-3708
10	Tissue Metabolism of Rats Treated with Uranyl Nitrate by Joe Meyer, John A. Muntz, Thomas P. Singer, and E. S. Guzman Barron	MDDC-757 CH-3710
11	The Reversible Inhibition of Enzymes by Uranium by Thomas P. Singer, John A. Muntz, Joe Meyer, Betty Gasvoda, and E. S. Guzman Barron	AECD-2021 CH-3739
12	Effect of Uranium on the Metabolism of Yeast and Bacteria by John A. Muntz, Thomas P. Singer, and E. S. Guzman Barron	MDDC-759 CH-3716
13	An Introduction to the Nonclassified Literature Dealing with Biochemical Studies of Experimental Uranium Poisoning by Samuel Schwartz and Elaine J. Katz	CH-3712
14	Uranium Distribution Studies by Renato J. Ferretti and Samuel Schwartz	MDDC-541 CH-3593
15	The Effect of Uranium Exposure on Urinary Catalase Excretion by Elaine J. Katz, Louise G. Holt, and Samuel Schwartz	MDDC-1375 CH-3594
16	Studies of Porphyrin Metabolism. The Effect of Metals on Coproporphyrin Excretion by Samuel Schwartz and Ralph Zagaria	MDDC-504 CH-3600
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BIOLOGICAL STUDIES WITH POLONIUM, RADIUM, AND PLUTONIUM

Edited by Robert M. Fink

Published 1950
McGraw-Hill Book Company, Inc., New York
411 pages plus xvi pages

Chapter		Report No.
	Part I – Distribution and Excretion of Polonium	
	Introduction by H. E. Silberstein	AECD-2591
1	General Methods Used in Polonium Distribution and Excretion Experiments by A. T. Gorham, Robert M. Fink, C. P. Kimball, W. L. Minto, H. E. Silberstein, E. K. Vittum, W. F. Bale, T. Enns, and E. L. Alling	AECD-2591
2	Polonium Distribution and Excretion Experiments with Animals by H. E. Siberstein, W. L. Minto, Robert M. Fink, G. A. Boyd, R. G. Metcalf, W. Mann, C. P. Kimball, and A. T. Gorham	AECD-2591
3	Studies of Polonium Metabolism in Human Subjects by H. E. Silberstein, W. N. Valentine, W. L. Minto, J. S. Lawrence, Robert M. Fink, and A. T. Gorham	AECD-2591
	Part II – Distribution and Excretion of Radium	
4	Historical Background by H. E. Silberstein	AECD-2592
5	General Methods Used in Radium Distribution and Excretion Experiments by H. E. Silberstein	AECD-2592
6	Radium Distribution and Excretion Studies with Rats by H. E. Silberstein	AECD-2592
	Part III – Toxicity of Polonium, Plutonium, and Radium in Rats	
7	Pilot Studies on the Intravenous Lethal Dosage of Polonium, Plutonium, and Radium in Rats by G. A. Boyd, H. E. Silberstein, Robert M. Fink, A. Frenkel, W. L. Minto, R. G. Metcalf, G. Casarett, and G. M. Suter	AECD-2593
8	Simultaneous Studies on the Intravenous Lethal Dosage of Polonium, Plutonium, and Radium in Rats by G. A. Boyd, A. Williams, W. L Minto, D. V. Tiedeman, Robert M. Fink, G. Casarett, and R. G. Metcalf	AECD-2605
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NNES – VIII – 8

MEDICAL EFFECTS OF THE ATOMIC BOMB IN JAPAN

Edited by Ashley W. Oughterson and Shields Warren

Published 1956
McGraw-Hill Book Company, Inc., New York
477 pages plus xvi pages

Chapter		Report No.
1	Summary	
2	Prelude to Medical Investigation	
3	Scope of Damage and the Effects on Medical Care and Facilities	
4	Number and Types of Casualties	
5	Clinical Observations in Hiroshima and Nagasaki	
6	Hematology of Atomic-bomb Injuries	
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Distribution:

Re: Transmittal of Report SAND99-1114, "The National Nuclear Energy Series: An Abridged Compilation"

Enclosed is a copy of the subject report prepared by Nancy Orlando-Gay, James Brangan, and Jonathan Wise of Sandia National Laboratories. This report summarized the current status of the National Nuclear Energy Series, which is a 1950's era technical history of the scientific and engineering advances made as part of the Manhattan project.

This report was prepared under the auspices of the Nuclear Transfer and Supplier Policy Division (NN-43) of the Department of Energy, Ms. Trisha Dedik, Director. Comments or questions regarding this report are welcome and may be directed to James Brangan at (505)-844-1832 or to Jonathan Wise at (505)-844-8547.

Sincerely,

Randall K. King

Randall K. King
Export Control Program Manager

Enclosure: As stated